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A mapping review of take-home naloxone for people released from correctional settings

Meredith Horton¹, Rebecca McDonald², Traci C. Green^{3,4}, Suzanne Nielsen^{1,5}, John Strang², Louisa Degenhardt¹ & Sarah Larney^{1*}

¹National Drug and Alcohol Research Centre, University of New South Wales, Sydney, NSW, Australia

²National Addiction Centre, King's College London, London, UK

³Boston Medical Center Injury Prevention Center, Department of Emergency Medicine, Boston University School of Medicine, Boston, Massachusetts, USA

⁴Department of Emergency Medicine, Warren Alpert School of Medicine, Brown University, Providence, Rhode Island, USA

⁵Drug and Alcohol Services, South Eastern Sydney Local Health District, Sydney, NSW, Australia

*Corresponding author

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Abstract

Background: People released from correctional settings are at an elevated risk of opioid overdose death in the weeks immediately following release. However, it is not well understood how this population, as a particularly high-risk group, is included in, and benefits from take-home naloxone (THN) programs. The objective of this review is to map research into THN for people released from correctional settings in order to identify further research needs.

Method: We searched electronic databases, grey literature, and conference abstracts for reports on THN for people in or released from correctional settings. Studies were categorised into themes defined by the study's aims and focus. Results from each study were summarised by theme.

Results: We identified 19 studies reporting on THN programs for people released from correctional settings. Studies have examined attitudes towards naloxone among people in custody or recently released from custody (theme 1), and among non-prisoner stakeholders such as prison staff (theme 2). Evaluations and interventional studies (theme 3) have examined process indicators and approaches to naloxone training, including for contacts of prisoners, but there are challenges in assessing health outcomes of THN in the correctional context. Case reports suggest that training in correctional settings translates to action post-release (theme 4).

Conclusion: The feasibility of THN in the context of release from a correctional setting has been established, but there is a need for rigorous research into health outcomes and program implementation. This is an emerging field of study and ongoing assessment of the state of the literature and research needs is recommended.

Keywords: naloxone; prisons; prisoners; drug overdose; analgesics, opioid; opioid antagonists

Overdose is a common event, both to experience and witness, for those who use opioids, and is the leading cause of death in this population (Degenhardt et al., 2011). In recent years, rates of opioid overdose have been on the rise worldwide, including in the U.S., Australia, Canada, and the United Kingdom (HRI, 2016). The World Health Organization estimates that 70,000 people die of opioid overdose annually (WHO, 2014).

Opioid overdose death is a result of respiratory depression that occurs over a period of time that varies with the types of opioids consumed, concurrent use of other substances, presence of systemic disease such as HIV, and genetic variations in metabolizing enzymes (Darke, Kaye, & Duflou, 2006; Gasche et al., 2004; Gossop, Stewart, Treacy, & Marsden, 2002; Green, McGowan, Yokell, Pouget, & Rich, 2012). The majority of overdoses occur in the company of others (Best et al., 2002; Strang et al., 2008; Strang et al., 1999); the presence of bystanders means there is opportunity for effective intervention to prevent death in the event of an opioid overdose.

Naloxone is a short-acting opioid antagonist that reverses respiratory depression in an opioid overdose. Three independent systematic reviews support the effectiveness of community-based naloxone training and distribution programs in reducing overdose deaths (Clark, Wilder, & Winstanley, 2014; European Monitoring Centre for Drugs and Drug Addiction, 2015; McDonald & Strang, 2016). Take-home naloxone (THN) programs have become increasingly common in recent years, but the research is in its fledgling stages; there are still many questions regarding the most effective way to reach the populations who are at the greatest risk of overdose death.

One particularly high-risk group of opioid users comprises people recently released from correctional settings. Risk of overdose death increases by three to eightfold in the two weeks following release from custody compared to other times at liberty (Merrall et al., 2010). Research has consistently shown strong links between opioid use and dependence, and mortality within the immediate time period following release from correctional settings, thus highlighting the importance of expanding THN programs to target this high-risk group (Binswanger et al., 2007; Clark et al., 2014; Farrell & Marsden, 2008; Merrall et al., 2010).

Prison-based take-home naloxone distribution has been introduced to varying degrees in Estonia, Norway, Spain, and parts of the United Kingdom, Canada and the United States (Clear, 2015; HRI, 2016; Information Services Division, 2015; Public Health Wales, 2015). The relative paucity of existing prison-focused THN programs combined with the corresponding lack of research into such programs presents an obstacle in the expansion effort.

We aimed to review the current state of research into THN for people released from correctional settings and map themes emerging from the literature in order to assess available evidence and identify gaps in the knowledge that might benefit from further research.

Methods

We elected to use an evidence map review methodology – an emerging review technique with an emphasis on “identify[ing] gaps in knowledge and/or future research needs” (Miake-Lye, Hempel, Shanman, & Shekelle, 2016). Mapping reviews differ from standard narrative reviews in that they employ systematic search methods and specifically seek to identify knowledge gaps and research needs, whereas narrative reviews may vary in comprehensiveness and be undertaken for other purposes (e.g. historical analyses of an intervention) (Grant & Booth, 2009).

Systematic searches were conducted in the electronic databases Medline, Embase, Google Scholar and Scopus using relevant search terms during the last week of June 2016, and updated in October 2016. In order to develop a comprehensive inventory of the current state of research, we used a sensitive search strategy with low specificity that imposed no restrictions on study design, date of publication or language of publication. The formal search strategy can be found in *Appendix 1*. Initial search results were imported into Endnote X7, and titles and abstracts were screened by two reviewers (MH and SL) for relevance. Full texts of papers potentially within the scope of the review were obtained and judged against pre-determined inclusion and exclusion criteria by the same two reviewers to determine the final pool of studies. Studies were included if they met one of the following inclusion criteria:

- Studies of knowledge, attitudes and willingness to be trained in naloxone use among people detained in, soon to be released from, or recently released from a correctional setting
- Studies of naloxone training or distribution to people in or leaving correctional settings
- Studies regarding naloxone training or distribution to people released from correctional settings from the perspectives of:
 - Correctional staff
 - Health workers
 - Other stakeholders

Internet searches were also performed to obtain reports from the Scottish Information Services Division (ISD) and from the Harm Reduction Database (HRD) of Public Health Wales, on the basis of prior knowledge that these countries were operating THN programs for prisoners. The list of included studies was circulated via email to all authors of this mapping review to check for completeness and request data that may not have been identified in our search. The email was redistributed to further contacts of the authors as they saw appropriate. Select conference databases were additionally hand-searched for relevant abstracts. During searching, we identified reports that focused on training visitors of people in custody, which we elected to include, even though these did not fall within our original inclusion criteria. This led to inclusion of two additional studies. We did not search for or include studies of community-based THN programs that incidentally serve people recently released from custody.

Data extraction was performed by MH and SL based on the features of each study, including participants, aim, design, and main findings. Studies were categorized into the following themes that emerged during data extraction: *1) Attitudes toward naloxone among people in custody or recently released from custody; 2) Attitudes of non-prisoner stakeholders; 3) Evaluations and interventional studies; 4) Documenting THN use after release from a correctional setting.* The major findings from each study are described under these themes.

Results

The initial searches identified 257 references (Figure 1). After deleting 57 duplicates, 181 studies were excluded; these included papers that focused on naloxone programs outside of a correctional setting, opioid substitution therapy, other substance use disorders in prisons, or commentaries and program descriptions lacking quantitative or qualitative data.

Of the 19 included studies, 10 were conducted in the United States, and nine in the United Kingdom. Though there was no restriction on date of publication, all studies were published between 2009 and October 2016, with five of the 19 studies published in 2016 alone. Table 1 provides a summary of all included studies.

1) Attitudes toward naloxone among people in custody or recently released from custody

Five studies employed cross-sectional surveying methods, either written surveys or qualitative interviews, to gather information from current or recently released prisoners. Four of these studies were quantitative and conducted in the following U.S. cities – Providence, Rhode Island; Madison, Wisconsin; Birmingham, Alabama; Denver, Colorado (Barocas et al., 2015; Binswanger et al., 2013; Cropsey et al., 2013; Wakeman et al., 2009). The other study contained both quantitative and qualitative analysis and was conducted in the UK (Sondhi, 2016). All studies in this category had similar participants and aims; each evaluated the overdose experiences and willingness to use naloxone among people recently released from custody to assess feasibility of correctional setting-based THN programs. Participants were commonly recruited out of convenience from community programs that support or monitor recently released inmates, including syringe exchange programs, re-entry agencies, methadone maintenance programs and community corrections supervision offices. Findings across the five studies were remarkably uniform, with at least one-third of respondents reporting a personal history of overdose, and approximately 70-80% having witnessed at least one overdose. Response to overdose was surveyed in four of the studies, with respondents indicating that emergency services were called in 50% of cases or fewer (Binswanger et al., 2013; Cropsey et al., 2013; Wakeman et al., 2009). Further investigation in three studies revealed that some other type of action was taken, suggesting willingness to intervene (Cropsey et al., 2013; Sondhi, 2016; Wakeman

et al., 2009), but with survey participants in one study citing “fear of police involvement” and “tried to handle the situation alone” as reasons for not contacting emergency services (Wakeman et al., 2009).

There was an overall very favourable attitude toward participation in naloxone training programs and a willingness to use the antidote if it were available. In three of the five studies, over 72% of participants expressed interest in training (Binswanger et al., 2013; Cropsey et al., 2013; Wakeman et al., 2009), with one survey reporting 90% of respondents willing to participate in a two-hour overdose prevention training including the administration of naloxone (Wakeman et al., 2009).

The study conducted in the UK provided quite a different perspective. Sondhi surveyed people in custody across ten English prisons, who were receiving THN training. This cohort of people had experienced similar rates of personal overdose (54%) and witnessing overdose in others (73%) as those in the US studies. Importantly, this study also assessed prisoners’ knowledge of THN prior to training, followed by evaluation of their confidence in naloxone administration and intent to carry the kit post-release, after completion of the training. Prior knowledge of THN was poor, but both confidence in THN administration and intent to carry kits improved with training (Sondhi, 2016).

This study also collected qualitative data from prisoners regarding their perceptions of barriers to implementation of prison-based THN programs. Four key themes were identified: 1) THN programs as a harm reduction intervention send a potential mixed message regarding abstinence/recovery; 2) there is an overall lack of THN knowledge, perception of negative side effects, and confusion with naltrexone; 3) concerns that possession of THN would encourage risky drug use among those who had been trained; and 4) concern with negative responses from police/authorities regarding naloxone carriage and intent to use is common.

These studies provide further evidence for high prevalence of exposure to overdose in populations currently in or recently released from correctional settings. These groups were receptive to the idea of THN training and distribution programs, but focus groups with current English prisoners identified

common misconceptions and concerns that may affect the successful establishment of prison-focused THN programs.

2) Attitudes of non-prisoner stakeholders

Only one study focused on non-prisoners (Sondhi, Ryan, & Day, 2016). This study by Sondhi *et al.*, also conducted across ten English prisons, employed qualitative interviews to assess the attitudes of prison-based healthcare staff and substance misuse service staff, along with naloxone suppliers and strategic leads for NHS England toward prison-based THN programs.

Four themes emerged during this study: 1) confusion and negative perceptions of THN among stakeholders, such as potential to encourage drug use, confusion with the abstinence/harm reduction dichotomy, and practical concerns around having a needle in the THN kits (Sondhi, 2016); 2) potential difficulties with identifying and engaging eligible prisoners for training, e.g. how to identify those with a history of opiate use; 3) a strong need to engage senior prison staff to ensure access to the support and timely problem-solving required for the implementation of such a program; and lastly, 4) the need to focus on individual prison processes to achieve effective dissemination and concerns about the technicalities surrounding the actual distribution of THN e.g. differences in the points and places where THN was held in the system, and how this would affect correct distribution.

3) Evaluations and interventions

Evaluations of national THN programs

Five publications evaluated the THN programs in Scotland and Wales. These two programs are currently the only publicly funded, national-level THN programs that involve training and naloxone distribution for prisoners on release; these are undertaken as components of broader, community-based efforts. Three of these five publications focus on Scotland's National Naloxone Program (NNP), including two peer-reviewed publications by Bird *et al.*: a protocol paper describing the methods for evaluating the NNP (Bird *et al.*, 2015), and the outcome of this evaluation (Bird *et al.*, 2016). This evaluation demonstrated that the proportion of all opioid-related deaths occurring in the four weeks post-release decreased significantly from 9.8% to 6.3% (Bird *et al.*, 2016). Annual

monitoring reports from the Information Services Division of Scotland continue to evaluate the NNP (Information Services Division, 2015).

Two publications on the national THN program in Wales, also initiated in 2011, were included. One study comprised pre and post-training assessments of participants recruited from the community and prisons, which indicated that knowledge and confidence to recognize opioid overdose and respond by administering naloxone increased among all trainees; results were not reported by prisoner status (Bennett & Holloway, 2012). The second publication is the product of a large-scale assessment of Wales' entire THN program. It reports that the four prisons in Wales, all of which are male-only facilities, are responsible for distribution of 20.5% of all THN kits supplied to unique male individuals per year (Public Health Wales, 2015), but did not describe further impact or outcomes.

Intervention Studies

Six intervention studies, plus a protocol paper for one of these intervention studies, were identified (Green, Bowman, Ray, McKenzie, & Rich, 2014; Green et al., 2015; Kobayashi et al., 2016; Parmar, Strang, Choo, Meade, & Bird, 2016; Rosner et al., 2015; Siegler et al., 2015; Strang, Bird, & Parmar, 2013). Three of these studies involved evaluation of a training intervention and were conducted in the United States within the Rhode Island Department of Corrections. These studies focus on the specific methods used to train people in custody on overdose prevention, risk and response (naloxone administration). One of the studies reports on the development of an educational video and didactic training specifically targeting the correctional population and its unique risks (Green et al., 2015). In two subsequent studies, this training was employed as the educational intervention after baseline overdose knowledge was assessed in a group of soon-to-be released prison inmates (Green, Bowman, et al., 2014; Kobayashi et al., 2016). Follow-up assessments were conducted among this sample one month after completion of the initial training and re-entry into the community. A novel aspect of this research was the researchers' use of mannequin-simulated overdose scenarios as the means of evaluating effectiveness of the prison-based THN training and distribution program. Results revealed significant improvement in overdose recognition, response, and self-efficacy regarding these

occurrences, suggesting that simulation is an effective means of overdose training assessment and that further exploration of naloxone training and distribution as a standard release procedure is warranted (Green, Bowman, et al., 2014; Kobayashi et al., 2016).

We identified a protocol paper describing the N-ALIVE trial, the only randomized controlled trial of THN for people leaving custody (Strang et al., 2013) as well as the published findings from the pilot trial (Parmar et al., 2016). The protocol paper detailed the aims of N-ALIVE – to distinguish whether THN distributed to people released from correctional settings prevents heroin overdose deaths. The trial was designed to test whether pre-provision of naloxone plus information to prisoners on release decreased overdose deaths specifically in those provided with the antidote and educational material. The pilot study, which began to randomize participants with a history of heroin use to either treatment as usual or treatment as usual with THN in 2012, planned to involve 2,800 prisoners on release in England (Parmar et al., 2016). If a marked decrease in opioid-related deaths was detected in this preliminary phase, a subsequent large-scale trial involving 28,000 prisoners on release was planned to follow. However, the pilot study was stopped prematurely after Scotland released three year results of their NNP, prompting an unscheduled interim analysis of N-ALIVE. This analysis revealed that two-thirds of administrations of THN were to someone other than the individual who had been given the kit, which prevented analysis of the primary outcome – whether THN could reduce drug-related-deaths of people released from custody. Though the trial showed that large scale randomized trials are feasible within the prisoner population, the investigators concluded that the trial would not be able to adequately assess whether THN can reduce post-release mortality (Parmar et al., 2016).

Finally, a novel intervention operating out of the visitor's centre at Rikers Island correctional facility in New York City was identified. Rather than training detainees themselves, this intervention targets people visiting detainees. Over a six-month period, the program trained 1,406 visitors in overdose prevention and naloxone administration, and distributed 1,015 THN kits. Over this time, eight trainees reported that they had used their naloxone to reverse an overdose (Rosner et al., 2015). An evaluation mapping the distribution of THN kits through this project reported that 34.6% of kits were distributed

to neighbourhoods with above average opioid overdose rates, and 22.4% of kits were distributed to neighbourhoods with the highest rates of residents re-entering after incarceration (Siegler et al., 2015).

4) Documenting THN use following release from a correctional setting

A case report provided insight into how THN training and distribution prior to release from a correctional setting can increase awareness of overdose risk and prevent accidental opioid-related death post-release (Green, Ray, Bowman, McKenzie, & Rich, 2014). The two cases reported were individuals who had previously completed the video and didactic based training within the Rhode Island correctional system as participants in one of the feasibility interventional studies by Green *et al.* described above (Green, Ray, et al., 2014). Part of the research protocol involved placing emphasis on educating others within the user's social network about overdose response and the administration of naloxone. Upon release, each trainee was provided with an intranasal THN kit, and had instructed someone on how to use the naloxone. In both reported cases, the person overdosing self-administered part or most of the naloxone, and was then assisted by the trained bystander. In their discussion of these cases, the authors stress the low likelihood that a person experiencing the respiratory depression of opioid overdose will be able to self-administer naloxone, and thus emphasize the importance of training others within the user's home or drug use network.

Discussion

Current state of literature

There has been very little research in the area of TNH for people released from custody, with few studies or evaluations aimed at determining if post-release mortality is decreased through THN distribution at release. Rather, the focus has been on assessing prisoner knowledge and attitudes towards THN, and outcomes of training interventions. The geographical coverage of the studies was particularly limited, with all research being conducted in the United States or United Kingdom, which may limit the generalizability of this mapping review to regions with comparable infrastructures and resources. Demographically, most of the existing literature is based on data collected from male prisoners, yet women in correctional settings are statistically more drug-involved than male prisoners

(Fazel, Bains, & Doll, 2006; Merrall et al., 2010). Investigation into the differences in THN training needs, outcomes, and logistics specific to the structure and dynamics of female imprisonment is warranted.

Areas for further research

Outcome evaluations and clinical trials

Evaluations of national THN programs have demonstrated that correctional settings are important – and feasible – sites for naloxone training and distribution. However, there is a need for further work aimed at determining the impact of THN programs on health outcomes. As the outcomes of interest – fatal and non-fatal overdose – are rare, pooled analyses across programs may be a useful approach for evaluating program effectiveness. We recommend that city-wide and national programs, both established and developing, along with proposed clinical trials, collaborate to review evaluation methods and identify consistent approaches that would enable comparisons between programs and pooled outcome analyses. As well as impacts on post-release overdose mortality, such work should also examine adverse events and unintended negative consequences of THN for people leaving custody. The experience of the N-ALIVE trial suggests that individual randomization to THN may not be the most appropriate design for clinical trials in this area that use mortality as their primary outcome, and hence other approaches to rigorous outcome evaluation should be explored (Parmar et al., 2016). Randomized controlled trials may still be of use in evaluating other outcomes, such as the necessary components or duration of naloxone training programs.

Addressing technical barriers to implementation

Several of the recent studies within this review have begun shifting the focus of research toward aspects of program implementation and highlight gaps in this knowledge. Sondhi’s evaluation of barriers to program implementation from the perspectives of prisoner and non-prisoner stakeholders has revealed a need to understand prison processes, explore implementation of training at different time points in an inmate’s sentence, and engage prison staff of varying levels of seniority in order to address barriers to implementation such as identifying and recruiting eligible prisoners for training

and disseminating THN kits (Sondhi et al., 2016; Sondhi, 2016). These variables may differ between settings and local assessment is likely to be required before design and implementation of a THN program.

Focusing on the training itself, three of the interventional studies by Green and colleagues explored the use of didactics and video as methods of training for engagement and information retention within this target population. This research is an important foundation for further experimentation with elements of training. Though previous studies have reported on sufficient training methods conducted for opioid users in community programs, these findings may not be applicable to people in correctional settings (Behar, Santos, Wheeler, Rowe, & Coffin, 2015; Clark et al., 2014). There is a need to address the varying learning styles, literacy levels, primary languages, and incarceration experiences of this population through further interventional studies. It is also imperative to understand the optimal duration and contents of training.

It is fundamental to clarify the context of opioid use among this population post-release, as when and where they use drugs and experience overdose are critical in determining when and where training and THN distribution should occur, and who should be targeted. Furthermore, studies in this review highlighted that naloxone kits distributed by correctional facilities are used to reverse overdose in people other than the original recipient of the kit (Parmar et al., 2016), and that kits are taken to communities with high overdose rates (Siegler et al., 2015). These findings suggest that naloxone kits distributed by correctional facilities should be viewed as part of broader overdose prevention efforts. Epidemiological questions in need of answers include timing and context of opioid use post-release, and the impact of THN in correctional settings on overall overdose mortality rates.

Addressing confusion and negative perceptions of THN

Prisoner and non-prisoner stakeholders have both expressed confusion regarding perceived conflict between harm reduction and the abstinence focus of correctional settings, and prisoners specifically expressed concern that carrying naloxone would lead to further sanctions from law enforcement officials within the prison and community. These concerns demonstrate need for naloxone education

among all stakeholders. Engagement of prison officers in naloxone training and program implementation may assist in addressing misperceptions and changing attitudes towards overdose, as has been the case among police officers receiving naloxone training (Saucier, Zaller, Macmadu, & Green, 2016; Wagner, Bovet, Haynes, Joshua, & Davidson, 2016).

Limitations of the literature and this review

All published research on this topic has been conducted in the United States or the United Kingdom. This should be borne in mind when considering applicability of specific study findings to other contexts. There is a clear need for research outside these contexts to broaden the evidence base and provide local data to inform program design and implementation.

Ongoing studies that have not yet published outcomes or other data were not eligible for inclusion in this review. We are aware of several ongoing studies that will provide valuable evidence to answer questions regarding THN for people leaving custody. For example, the U.S. National Institute on Drug Abuse has funded a California-based study (NIH project number: 5R34DA039101-02) that aims to “identify barriers and facilitators [of THN programs] in venues that target people exiting incarceration and their family members”.

We chose not to perform a quality assessment of included studies because it is not a characteristic component of this type of evidence mapping review (Miake-Lye et al., 2016). Furthermore, we aimed to describe the current literature on THN for people released from correctional settings in order to identify knowledge gaps for further study, rather than determine the reliability of the evidence to inform clinical or policy decision-making (Katikireddi, Egan, & Petticrew, 2015).

Conclusion

Current evidence suggests that correctional settings are important sites for naloxone training and distribution. Surveys have shown positive attitudes toward potential THN programs and evaluations of existing programs have demonstrated feasibility, but there is a need for research into health

outcomes and program implementation. This is an emerging field of study and ongoing assessment of the state of the literature and research needs is recommended.

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Figure 1. Flowchart for inclusion and exclusion of literature.

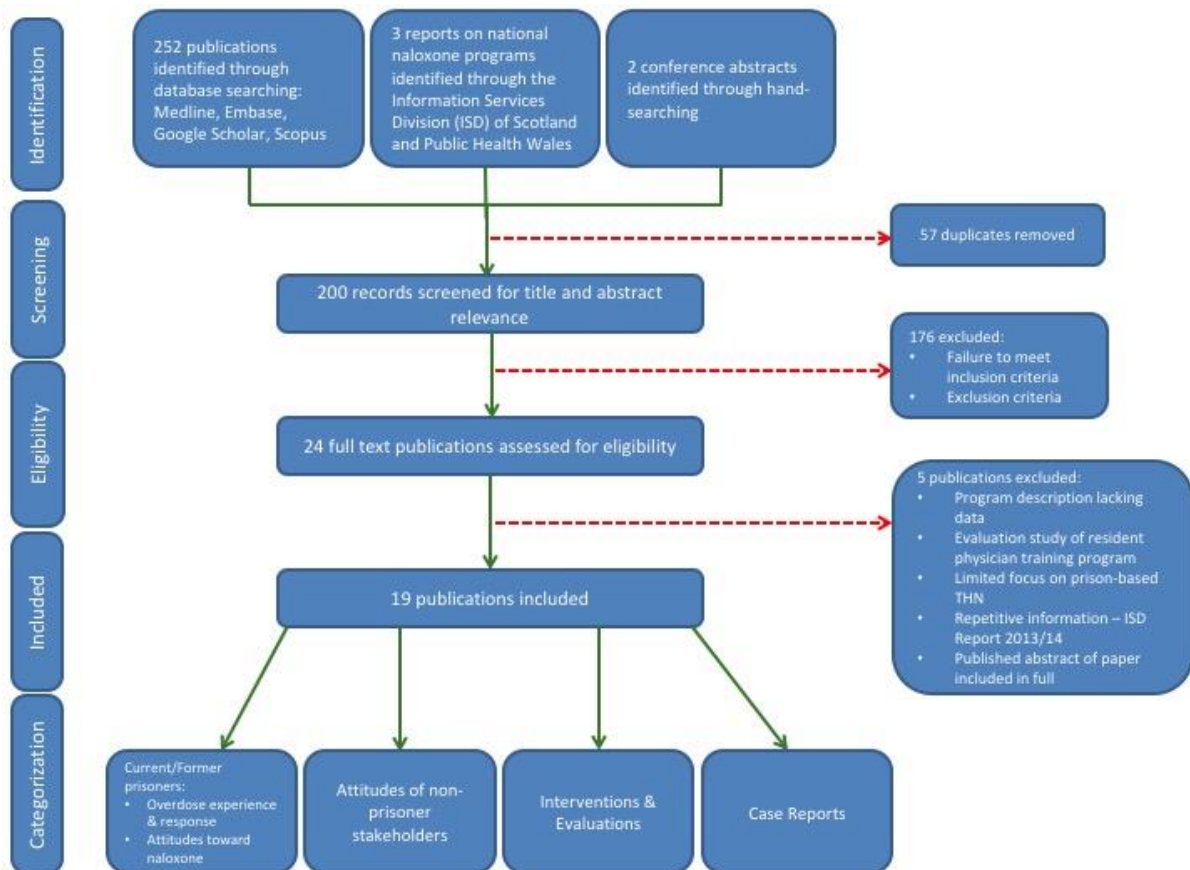


Table 1. Characteristics of studies included in evidence map.

Category	Study	Setting	Aims	Design/Methods	Sample	Main Findings
Studies of attitudes toward naloxone among people in custody or recently released from correctional settings	Barocas et al. (2015)	Madison, WI, USA	To improve understanding of the acceptability and current uptake of naloxone-based OD prevention training among PWID who interact with the criminal justice system.	Survey	PWID at multi-site syringe exchange program, stratified by history of incarceration (N=543)	People with history of incarceration more likely to have: <ul style="list-style-type: none"> • Experienced OD - 41% • Witnessed OD - 85% • Received naloxone training • Administered naloxone in practice
	Binswanger et al. (2013)	Denver, CO, USA	To examine the overdose experiences among former prison inmates and their attitudes towards naloxone for bystander use after release from prison.	Structured interviews, prospective longitudinal cohort study	Former prison inmates recruited from community and re-entry agencies (N=193)	<ul style="list-style-type: none"> • 32% had received medical attention for OD • 53% had witnessed heroin OD • Emergency services was called in 53% of witnessed ODs • 86% willing to be trained to use naloxone • 90% willing to give naloxone to a person overdosing
	Cropsey et al. (2013)	Birmingham, AL, USA	To compare individuals under community criminal justice supervision with and without a personal history of opioid overdose and explore differences in experience with prevention and treatment of overdose and openness to educational training in naloxone administration.	Survey	Individuals over 19 y/o under community corrections supervision (N=478)	<ul style="list-style-type: none"> • 40% had experienced OD • 78% had witnessed OD • 72% had favourable attitude toward THN training • Emergency services was called in 13% of witnessed ODs • Those with OD experience were more receptive to naloxone than those without
	Wakeman et al. (2009)	Providence, RI, USA	To examine the perceptions and experiences of overdose among long-term opiate users involved in the criminal justice system	Survey	Long-term opiate users recently released from prison; Recruited from methadone maintenance program (N=137)	<ul style="list-style-type: none"> • 53% experienced OD • 80% witnessed OD • Emergency services called in 52% of cases • 72% interested in naloxone prescription • 90% willing to complete 2 hour training session
	Sondhi (2016)	England, UK	To understand prisoner perceptions on being trained and having received THN on release from prison for opioid overdose prevention	<ul style="list-style-type: none"> • Survey • Focus groups using semi-structured interview technique 	<ul style="list-style-type: none"> • Survey: Prisoners in 10 prisons of varying security level (N=142) • Focus groups: 5 groups of prisoners with history of opiate use across 4/10 prisons (N=26) 	<ul style="list-style-type: none"> • 54% experienced OD, 73% witnessed OD • 42% taken to hospital for OD <p>THN training:</p> <ul style="list-style-type: none"> • 81% had no to limited knowledge of THN prior • Rated confidence in use as 8.5/10 post training • 65% intended to carry THN at all times • Focus groups revealed prevalence of confusion & negative perceptions regarding THN

Category	Study	Setting	Aims	Design/Methods	Sample	Main Findings
Attitudes of non-prisoner stakeholders	Sondhi et al. (2016)	England, UK	To assess potential barriers to the implementation of THN programs from the perspectives of prisoners and non-prisoner stakeholders across 10 English prisons	Focus groups - grounded theory analysis	Prison-based staff: • Healthcare workers • Substance misuse services Other stakeholders: • Naloxone suppliers • Strategic leads - NHS England	Potential barriers to THN identified: • Prevalence of confusion and negative perceptions of THN • Difficulty identifying & engaging eligible prisoners in training program • Need to engage senior prison staff • Problems with distribution of THN
Evaluations of national THN programs	Bird et al. (2015)	Scotland, UK	To summarize the background and protocol for before/after monitoring of Scotland's National Naloxone Program (NNP)	Evidence synthesis, development of performance indicator and statistical power for before/after monitoring	Individuals at risk of opioid overdose in the community and prisons in Scotland	Monitoring plan for Scotland's THN program: • Primary: proportion of ORDs with prison release as 4 week antecedent • Secondary: proportion of ORDs with prison release or hospital discharge as 4 week antecedent
	Bird et al. (2016)	Scotland, UK	To assess efficacy of Scotland's NNP by comparison of 2006-10 and 2011-13 using primary and secondary outcome indicators and cost-effectiveness assessment	Pre-post evaluation of Scotland's National Naloxone Program	Individuals at risk of opioid overdose in the community and prisons in Scotland	• 36% reduction in proportion of prison-release ORDs • 22% reduction in proportion of ORDs with prison release or hospital discharge as 4 week antecedent
	NNP Scotland Monitoring Report 2014-15 (2015)	Scotland, UK	To gather annual data on and assess efficacy of Scotland's NNP, including both community and prison-based components	Evaluation of Scotland's National Naloxone Program	Individuals at risk of opioid overdose in the community and prisons in Scotland	• 7,376 total THN kits issued in Scotland in 2014/15 • 6,498 kits issued in community (20% increase from 2013/14) • 878 kits issued in prisons (18% decrease from 2013/14) • Proportion of post release ORDs fell from 10% in 2006-10 to 3% in 2014 • Proportion of ORDs within 4 weeks of hospital discharge has decreased from 10% in 2006-10 to 9% in 2014
	Bennett & Holloway (2012)	Wales, UK	To determine the impact of naloxone training on knowledge of opiate overdose and confidence/willingness in overdose response and to examine use of THN at time of overdose events in order to determine establishment of national program in Wales	Repeated measures design - pre and post training assessment questionnaire; short screening questionnaire in comparison sample regarding overdose exposure	• Naloxone group: 521 opiate users and 4 non-opiate users from 5 community sites (N=362) and 3 prison locations (N=163) • Comparison sample: service users who contacted treatment agency within a 1 month period	• All trainees exhibited improvement in overdose knowledge, recognition, willingness and confidence in using naloxone after the training • Results do not distinguish between community and prisoner populations • 27/28 successful overdose reversals reported with naloxone administration

Category	Study	Setting	Aims	Design/Methods	Sample	Main Findings
Evaluations of national THN programs (cont.)	Public Health Wales Harm Reduction Database: Take Home Naloxone 2014-15 (2015)	Wales, UK	To gather annual data on and assess efficacy of Wales' NNP, including community and prison-based components	Evaluation of Wales' national naloxone program (implemented in 2011)	Community and prison based THN programs	<ul style="list-style-type: none"> • 21% of male unique individuals issued THN on release from prison • Increase of 10% of kits issued in prison compared with previous year
Interventional Studies	Green et al. (2014)	Providence, RI, USA	To conduct a feasibility study assessing prison-specific video based training and THN provision and outcome measure development in preparation for prison-based RCT of intranasal naloxone	Feasibility study for prison-based RCT; video based training intervention and follow-up simulation assessment	Inmates within 4 weeks of release (N=125) with self-reported opioid use history - Rhode Island Department of corrections	<ul style="list-style-type: none"> • Participants scored on average 11/18 correct responses upon follow up simulation • No adverse events of intranasal naloxone reported
	Green et al. (2015)	Providence, RI, USA	To develop a video for education on opioid overdose prevention, recognition and response containing prison-specific overdose risk messaging that can be used in the prison setting and disseminated elsewhere	Development of educational video	Focus groups of formerly incarcerated individuals, opioids users and correctional staff contributed input to video development	<p>Created video employs:</p> <ul style="list-style-type: none"> • Peer "learners" and "trainers" for OD education and naloxone administration • Direct address of post-incarceration OD risks • Observational learning
	Kobayashi et al. (2016)	Providence, RI, USA	To assess the post-release retention of opioid OD training using a simulation exercise whereby subjects have to demonstrate ability to respond to an OD, including use of naloxone.	Baseline OD knowledge assessment, DVD and didactic intervention, immediate follow-up knowledge assessment and 1 month post-release simulation assessed with 21 item checklist	Recently released inmates - Rhode Island correctional system; N=103 completed study intervention; N=85 completed follow-up simulation and evaluation	<ul style="list-style-type: none"> • Subjects scored a median of 12 out of 21 total indicated actions in OD simulated scenario • 49% performed non-indicated actions - e.g. chest compressions • 52% correctly administered naloxone • 19% administered naloxone sub-optimally - e.g. one nostril only or partial dose • 94% of subjects performed resuscitative actions determined to be overall beneficial
	Strang et al. (2013)	England, UK	To present the background and rationale behind the N-ALIVE trial - an RCT designed to test whether heroin overdose deaths post-release from prison can be prevented by prior provision of THN	Protocol paper of Randomized Controlled Trial (pilot)	5,600 prisoners on release in England	<p>Justification for trial based on:</p> <ul style="list-style-type: none"> • high concentration of heroin users in prison • high concentration of heroin OD deaths post-release • Users and carers are willing to intervene <p>Primary outcome: comparison of death rates amongst prisoners randomized to standard health after-care vs. prisoners provided with THN plus standard after-care</p>

Category	Study	Setting	Aims	Design/Methods	Sample	Main Findings
Interventional studies (cont.)	Parmar et al. (2016)	England, UK	To test feasibility of randomized provision of naloxone-on-release to eligible prisoners in England; to investigate if naloxone-on-release could reduce drug related deaths after prison release (primary outcome)	Pilot Randomized Controlled Trial	2,800 prisoners on release in England (1,685 were randomized at time trial was stopped)	<ul style="list-style-type: none"> • Trial stopped early because 2/3 of naloxone-on-release administrations were not to the ex-prisoner for whom it was prescribed • Trial not able to address primary outcome • RCTs may not be best study design to assess whether naloxone-on-release can reduce drug related deaths • However, large scale randomized trials are feasible within prisons
	Rosner et al. (2015)	New York City, NY, USA	To train visitors of inmates at Riker's Island correctional facility in overdose prevention, naloxone administration, and provide them with THN as a means of targeting a high risk population	Pilot training program	Family and friends visiting jail inmates at Riker's Island	<ul style="list-style-type: none"> • In small pilot (April 2014) 218 visitors trained and 155 kits distributed • 1,406 visitor trained and 1,015 kits distributed from June - December 2014 • 8 reversals reported
	Siegler et al. (2015)	New York City, NY, USA	To assess whether THN kits distributed through the Riker's Island visitor training pilot program are reaching NYC communities with highest rates of opioid overdose, formerly incarcerated individuals and poverty	Analysis of demographic information (e.g. zip codes) with NYC DOHMH report data	Family and friends visiting jail inmates at Riker's Island	<ul style="list-style-type: none"> • 35% of kits distributed to neighbourhoods with above average opioid OD rates • 22% of kits distributed to neighbourhoods with highest rates of re-entry after incarceration • 15% of kits distributed to areas with highest poverty rates
Documenting THN use after release from a correctional setting	Green et al. (2014)	Providence, RI, USA	To describe cases of two individuals, who had received prison-based THN training and provision on release, and self-administered intranasal naloxone upon heroin overdose following re-entry	Narrative report	Two participants in feasibility study (Green et al. 2014)	<ul style="list-style-type: none"> • Two self-reported naloxone administration cases upon heroin overdose post-release from prison • Bystander assistance was required in both cases

Appendix 1. Search terms and strategy.

Medline

Naloxone AND (prison OR jail OR gaol OR correctional OR corrective OR custody OR post-release)
NOT buprenorphine-naloxone

1. exp Naloxone/ or naloxone.mp.
2. prison.mp. or exp Prisons/
3. (jail or gaol).tw.
4. exp Prisoners/ or correctional.mp.
5. corrective.tw.
6. custody.tw.
7. post-release.tw.
8. or/2-7
9. buprenorphine.ti.
10. buprenorphine-naloxone.ti.
11. or/9-10
12. 1 and 8
13. 12 not 11
14. remove duplicates from 13

Sample Search (Medline (via Ovid platform) searched on 21/6/16):

	Searches	Results
1	exp Naloxone/ or naloxone.mp.	29622
2	prison.mp. or exp Prisons/	12502
3	(jail or gaol).tw.	1607
4	exp Prisoners/ or correctional.mp.	15476
5	corrective.tw.	11355
6	custody.tw.	1896
7	post-release.tw.	362
8	or/2-7	35450
9	buprenorphine.ti.	2822
10	buprenorphine-naloxone.ti.	209
11	or/9-10	2822
12	1 and 8	60
13	12 not 11	52
14	remove duplicates from 13	50

Embase:

1. exp naloxone/ or naloxone.mp.

2. prison.mp. or exp prison/ or exp prisoner/
3. (jail or gaol).tw.
4. correctional.tw.
5. corrective.tw.
6. custody.tw.
7. post-release.tw.
8. or/2-7
9. buprenorphine.ti.
10. buprenorphine-naloxone.ti.
11. exp buprenorphine plus naloxone/
12. 9 or 10 or 11
13. 1 and 8
14. 13 not 12
15. remove duplicates from 14
16. limit 15 to embase

Google Scholar:

With all of the words: naloxone

With at least one of the words: prison OR jail OR gaol OR correctional OR corrective OR custody OR post release

Without the words: buprenorphine naloxone

Where my words occur: in the titles of the article

➔ “allintitle: naloxone prison OR jail OR gaol OR correctional OR corrective OR custody OR post-release -buprenorphine-naloxone”

Scopus:

1. Naloxone
2. Prison or jail or correcti* or gaol
3. 1 AND 2